

U.S. Application No. 10/774,028, filed February 6, 2004
Attorney Docket No. 14329US02
Amendment dated November 30, 2010
Accompanying RCE filed November 30, 2010

Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application.

1. (Currently Amended) A system for communications, comprising:
 - a transport layer/network layer processing stack;
 - an intermediate driver coupled to the transport layer/network layer processing stack via a first miniport and a second miniport;
 - a first network interface card coupled to the intermediate driver; and
 - a second network interface card coupled to the intermediate driver,
 - wherein the second network interface card concurrently participates in a team with the first network interface card for a first type of traffic and in a system that offloads traffic for a second type of traffic that bypasses the intermediate driver,
 - wherein, if a third network interface card coupled to the intermediate driver fails, then the first network interface card and the second network interface card handle a load previously supported by the failed third network interface card,
 - wherein the first miniport supports teaming over the first network interface card and the second network interface card,
 - wherein the second miniport provides a dedicated upload path for the second network interface card of ~~a~~ the system that can offload traffic from the transport layer/network layer processing stack,
 - wherein the second network interface card uses the second miniport for first traffic uploaded from the system that can offload traffic from the transport layer/network layer processing stack and uses the first miniport for second traffic related to the teaming with the first network interface card, and
 - wherein the first network interface card uses the first miniport for third traffic related to the teaming.

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2. (Previously Presented) The system according to claim 1, wherein a first NDIS miniport is communicatively disposed between the intermediate driver and the first interface card, and wherein a second NDIS miniport is communicatively disposed between the intermediate driver and the second network interface card, and wherein a virtual bus driver is communicatively disposed between the second NDIS miniport and the second network interface card.
3. (Previously Presented) The system according to claim 1, wherein the first network interface card comprises a plurality of network interface cards.
4. (Previously Presented) The system according to claim 1, wherein the second network interface card comprises a remote-direct-memory-access-enabled (RDMA-enabled) network interface card.
5. (Previously Presented) The system according to claim 1, wherein the second network interface card is the only network interface card that supports traffic from the system that can offload from the transport layer/network layer processing stack.
6. (Original) The system according to claim 1, wherein the transport layer/network layer processing stack comprises a transmission control protocol/internet protocol (TCP/IP) stack.
7. (Original) The system according to claim 1, wherein the first miniport comprises a virtual miniport instance.
8. (Original) The system according to claim 7, wherein the virtual miniport instance

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comprises a virtual miniport instance adapted for teamed traffic.

9. (Original) The system according to claim 1, wherein the second miniport comprises a virtual miniport instance.

10. (Original) The system according to claim 9, wherein the virtual miniport instance comprises an RDMA-enabled virtual miniport instance.

11. (Original) The system according to claim 1, wherein the system that can offload traffic from the transport layer/network layer processing stack comprises a Winsock Direct system.

12. (Original) The system according to claim 1, wherein the second miniport supports traffic that is processed by the transport layer/network layer processing stack.

13. (Original) The system according to claim 1, wherein the second miniport supports traffic that has not been offloaded by the system that can offload traffic from the transport layer/network layer processing stack.

14. (Original) The system according to the claim 1, wherein traffic that has been offloaded by the system that can offload traffic from the transport layer/network layer processing stack bypasses the transport layer/network layer processing stack and the intermediate driver.

15. (Currently Amended) The system according to claim 1, wherein the intermediate driver concurrently supports teaming through a first path to the transport layer/network layer processing stack and uploading through a second path to the transport layer/network layer

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processing stack, the second path being a non-offload path.

16. (Original) The system according to claim 1, wherein the intermediate driver comprises a network driver interface specification (NDIS) intermediate driver.

17. (Original) The system according to claim 1, wherein the intermediate driver is aware of the system that can offload traffic from the transport protocol/network protocol processing stack.

18. (Original) The system according to claim 1, wherein teaming supports load balancing.

19. (Original) The system according to claim 1, wherein teaming supports fail over.

20. (Original) The system according to claim 1, wherein teaming supports virtual network capabilities.

21. (Currently Amended) A system for communications, comprising:

a first set of network interface cards comprising a second set and a third set of network interface cards, the second set comprising a network interface card that is capable of offloading one or more connections, the third set comprising one or more network interface cards that are not capable of providing an offload path;

an intermediate driver coupled to the second set and to the third set, the intermediate driver being part of a host computer and supporting teaming over the second set and the third set;

a host protocol processing stack coupled to the intermediate driver via a first virtual miniport instance and a second virtual miniport instance,

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wherein the third set of network interface cards concurrently participates in a team with the second set of network interface cards for a first type of traffic and in an offload system for a second type of traffic that bypasses the intermediate driver,

wherein, if a particular network interface card in a fourth set of network interface cards coupled to the intermediate driver fails, then a plurality of network interface cards from the first set handle a load previously supported by the failed network interface card of the fourth set,

wherein the teamed traffic of the second set and the third set passes through the first virtual miniport instance, and

wherein uploaded traffic from ~~an~~ the offload system passes through only the second virtual miniport instance that is dedicated to the third set, and

wherein the intermediate driver provides load-balancing over some or all of the first set.

22. (Previously Presented) The system according to claim 21, wherein the second set provides a kernel bypass path and wherein the third set does not provide a kernel bypass path.

23. (Previously Presented) The system according to claim 21,

wherein the second set is associated with a system that is capable of offloading one or more connections,

wherein the system that is capable of offloading one or more connections offloads a particular connection, and

wherein packets carried by the particular offloaded connection bypass the intermediate driver.

24. (Previously Presented) The system according to claim 21, wherein the intermediate driver provides fail over procedures.

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25. (Previously Presented) The system according to claim 21, wherein the host computer communicates, via a team of network interface cards from the second set and the third set, with a remote peer over a network.

26. (Currently Amended) A method for communicating, comprising:

(a) teaming a plurality of network interface cards using an intermediate driver of a host computer, the intermediate driver providing load balancing over some or all of the network interface cards and providing fail over procedures, wherein the teaming is performed by the host computer and/or the plurality of network interface cards, wherein plurality of network interface cards support remote direct memory access (RDMA) traffic, wherein teamed traffic passes through a first miniport that is

communicatively disposed between a host TCP/IP stack and the intermediate driver;

(b) adapting ~~at least one~~ a first network interface card of the plurality of network interface cards to provide concurrently support at least three paths to an application layer including an offload path, an upload path and a team path, the offload path and an the upload path being used for an offload system for a first type of traffic, the team path being used for a second type of traffic, the upload path passing through a second miniport dedicated to the adapted at least one network interface, the second miniport being communicatively disposed between the host TCP/IP stack and the intermediate driver, the offload path bypassing the intermediate driver and the host TCP/IP stack, wherein the intermediate driver concurrently supports teaming through the team path to the host TCP/IP stack and uploading through the upload path to the host TCP/IP stack;

(c) adapting remaining network interface cards of the plurality of network interface cards not to provide an offload path, wherein the teamed traffic over the adapted at least one network interface card and the adapted remaining network interface cards passing through the first miniport; and

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(d) if a second network interface card coupled to the intermediate driver fails, then at least two of the plurality of network interface cards handle a load previously supported by the failed second network interface card.

27. (Previously Presented) The method according to claim 26, wherein (b) comprises solely associating the offload system that is capable of offloading one or more connections with a single network interface card of the plurality of network interface cards.

28. (Currently Amended) A method for communicating, comprising:

teaming a plurality of network interface cards of a host computer, the plurality of network interface cards not providing an offload path that bypasses a kernel of the host computer;

adding an a first additional network interface card to the host computer, the first additional network interface card providing concurrently supporting at least three paths including an offload path, an upload path and a team path, an the offload path of an offload system that bypasses bypassing the kernel of the host computer, the and an upload path of the offload system that passes passing through the kernel of the host computer, the offload system being used for a first type of traffic, the team path being used for a second type of traffic, the upload path passing through a first miniport that is dedicated to uploaded traffic and the first additional network interface card, the first miniport being communicatively disposed between an intermediate driver and the host TCP/IP processing stack;

teaming the plurality of network interface cards and the first additional network interface card, the teamed traffic passing through a second miniport communicatively disposed between the intermediate driver and the host TCP/IP processing stack, wherein the first additional network interface card concurrently supports teaming, offloading and uploading; and

providing, by the intermediate driver, load balancing over the plurality of network interface cards and the additional network interface card, the intermediate driver being

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communicatively disposed between (1) the host TCP/IP processing stack and (2) the plurality of network interface cards and the additional network interface card, wherein the intermediate driver concurrently supports teaming through the team path to the host TCP/IP processing stack and uploading through the upload path to the host TCP/IP processing stack; and

adding a second additional network interface card to the host computer, wherein, if the second network interface card fails, then at least two network interface cards of the first additional network interface card and/or the plurality of network interface cards handle a load previously supported by the failed second additional network interface card.

29. (Previously Presented) The method according to claim 28, further comprising:
handling packets of a particular connection only via the additional network interface card, the particular connection being maintained by the offload system that is capable of offloading traffic from the host TCP/IP processing stack.

30. (Previously Presented) The method according to claim 28, wherein the intermediate driver provides fail over procedures.

31. (Previously Presented) The method according to claim 28, further comprising:
processing packets of a particular connection via the host TCP/IP processing stack, the particular connection not being an offloaded connection although being maintained by the offload system that is capable of offloading traffic from the host protocol stack.

32. (Original) The method according to claim 31, further comprising:
transmitting the processed packets only through the additional network interface card.